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## INTRODUCTION

Recently, epidemiological studies have demonstrated increased health symptomatology and lower functional status in troops returning from Gulf War (GW) in 1990-91 compared to other GW-era veterans (e.g., non-deployed personnel (Iowa Persian Gulf Study Group or Iowa et al., 1997; Haley et al., 1997; Fukuda et al., 1998; Unwin et al., 1999) or troops deployed to Germany during the same time period (Proctor et al., 1998; Proctor et al., 2001a)). However, lack of information about GW veterans' pre-deployment health status has made it difficult to fully evaluate the role that deployment experiences play in soldiers' health (PRD5, 1998, p. 34). Two projects are being conducted under this funding award. The cross-sectional survey study (project #1) addresses three research objectives and lays the ground work to establish a cohort of current Massachusetts Army National Guard (ARNG) members whose health status can be followed longitudinally as they remain State-side; are deployed for combat, peacekeeping, or civilian emergency duties; and after they leave the military. The primary objective is to describe the current health status of this National Guard cohort using methods that will permit comparison to other population norms (e.g., Medical Outcomes Study Short Form Health Survey, SF36 (Ware 1994); SF36V (Kazis et al., 1999)) and current surveillance system parameters (e.g., US Army Health Risk Appraisal). The second objective is to examine to what extent the job strain (Karasek 1979; Karasek and Theorell, 1990) of National Guard service as a 'second job' affects the relationship between the job strain of the service members' civilian jobs and health and job performance outcomes (functional health status, fatigue symptomatology, job performance). The third objective is to examine whether retention in the National Guard is related to current health status by additionally surveying a cohort of persons who have left National Guard service within the past 3-4 years. The study cohort includes all current Massachusetts (MA) ARNG members and prior members who have left ARNG service within the past three years (as of October 2000). Each subject is asked to complete a mail survey about his/her current health and deployment and occupational characteristics (both civilian and military). A prospective deployment health field study (project #2) involving a MA ARNG group deploying to Bosnia in 2001 and a comparison group (non-deployed) is being carried out to examine cognitive readiness and potential changes in health related to deployment. These two research studies are some of the first to focus exclusively on the role that one's Army National Guard job plays on health status and quality of life. Identification of specific occupational factors that relate either negatively or positively to health status is an important step towards designing and implementing effective strategies that will protect and improve the health of National Guard members in the current military environment (cf. PDR5, 1998; CDC Conference- Prevention Working Group Recommendations, 1999). Recent efforts in the area of deployment health and force health protection appear largely focused in the Active duty arena. As has been identified by the Institute of Medicine (2000), there is a need to focus research efforts on National Guard and Reserve forces in order to learn more about their specific issues and concerns in the current military climate.

## BODY

Two projects are being conducted under this funding award. The survey study (project #1) was initiated in January 2000 and the deployment health field study (project #2) was funded and initiated in May/June 2001.

The progress made during this funding period (January 2001- January 2002) is described below for each task outlined in the approved Statements of Work (SOW) for each project.

## **PROJECT #1: Role of Civilian and Military Jobs (the survey study)**

The survey study was initiated in January 2000 and therefore a progress report for Year 1 of the funding award was reported in the previous Annual Report.

[Summary of Year 1 SOW-shaded in gray]

### **Approved SOW tasks for the funding period (Jan. 24, 2000- Jan. 23, 2001)**

#### **Year 1**

<b>Task 1</b>	Months 1-3	Hiring of project staff; Organize Advisory Group
<b>Task 2</b>	Months 4-10	Finalize the survey instrument, via: Telephone and in-person interviews with current ARNG members
<b>Task 2a</b>		* Conducting structured telephone interviews with ARNG members
<b>Task 2b</b>		Pilot the survey instrument on group of 20 volunteers.
<b>Task 2c</b>		Convene a meeting of the Advisory Group to finalize survey instrument
<b>Task 2d</b>		Request updated list of current ARNG members from DMDC
<b>Task 3</b>	Months 11& 12	Determine number of persons who have left ARNG in past 3 years
<b>Task 4</b>	Months 11& 12	Pre-notification of study, at the unit level throughout MA
<b>Task 5</b>	Months 11& 12	Printing of final survey instrument and mailing materials

\* In our original proposal, we planned to conduct focus groups with ARNG members. However, due to difficulties in scheduling these focus groups, we decided to conduct individual interviews over the telephone with ARNG members. The Principal Investigator (PI) initiated approval for this change in the SOW in July 2000. Both the Boston University (BU) Institutional Review Board (IRB) and the US Army's Human Subjects Research Review Board (HSRRB) finally approved it in late October 2000 and notification of this approved change was received by the PI from her Contracting Officer on November 14, 2000.

### **Survey Study (Year 2)**

### **Approved SOW tasks for the funding period (Jan. 24, 2001- Jan. 23, 2002)**

#### **Year 2**

<b>Task 1</b>	Months 1	First wave mailing to current ARNG members and group who have left
<b>Task 2</b>	Months 2 & 3	Three follow-up reminders, including one re-mailing of survey
<b>Task 3</b>	Months 1-4	Set up of data entry procedures
<b>Task 4</b>	Months 1-6	Data entry completed
<b>Task 5</b>	Months 6	Convene Advisory Group to discuss response rates and analytic plans
<b>Task 6</b>	Months 6-10	Data checking and cleaning completed
<b>Task 7</b>	Months 9 & 10	Initiate and carry out linkage to HRA database
<b>Task 8</b>	Months 11& 12	Preliminary data analyses and descriptive analyses

All tasks listed for Year 1 were completed during that time frame except Task 6. Printing of the survey instrument and mailing materials was completed in early April 2001. This delay was because we did not receive final approval from the US Army's HSRRB for the survey instrument, cover letter, and consent form until March 27, 2001. (Submission of materials was made to both Boston University's IRB and HSRRB on January 3, 2001.)

***Tasks 1&2- First wave mailing to current ARNG members and group who have left & three follow-up reminders, including one re-mailing of survey [STATUS: In Progress]***

Mailing of the survey to 7,928 current and 3,924 former MA ARNG members was initiated in the 3<sup>rd</sup> week in April 2001. Within the first month after the initial mailing (by late May 2001) we had received a

return rate of completed surveys from approximately 4% of the total group. This was not the level of response that we were anticipating. So, in June 2001 we initiated a number of steps to try and increase the response and to figure out the reasons for the low response rate. We re-ran address searches to make sure we had the most up-to-date addresses. We submitted a request to the BU IRB and HSRRB to establish a study website ([www.nationalguardstudy.org](http://www.nationalguardstudy.org)) in order to more efficiently update the study subjects. Although we included 'Address Service Requested' on the outgoing envelopes, some of the initial mailing packets were returned to us as undeliverable (n=703) and about 3,000 were returned with new forwarding addresses. For the remaining ~8,000 persons for whom we did not receive any response, we assume that the survey packets reached the intended person. We received a number of telephone calls (n=~40) from subjects after the surveys went out. (Some of the reasons for subjects' calling included questioning how we got their home address (n=5) or whether the information would be made available to ARNG (n=8). Others called to tell us they did not want to participate and to take them off the mailing list (n=16) while others were glad we were doing the study (n=3). The remaining persons were family members who called to let us know their spouse had died.)

As outlined in the SOW and the proposal, the mail survey schedule was to mail out three successive reminders every two weeks or so after the initial survey was mailed. We found that we would have had problems meeting this schedule if we had gone forward with the survey-mailing plan. As was proposed, we involved 3 vendors to separately take care of the printing, mailing, and data entry procedures, but we did not foresee the amount of person time it would take us to process the incoming and outgoing mail and to keep the mail tracking system up-to-date in order to carry out the reminder mailings in a timely manner. So, in the summer of 2001 we initiated efforts to revise the administrative procedures for the mail survey plan and to request approvals for changes in consent procedures in order to improve the mail survey efficiency and effectiveness. In August 2001, the PI spoke to several mail survey companies to see how they structure their mailing schedules and the costs associated with having the survey company handle all the aspects of a survey mailing (printing, mailing, tracking, processing, and data entry). We tentatively made arrangements to proceed with a local research group with experience doing mail surveys that would handle all aspects of the survey-mailing plan. At the same time, the PI contacted the directors of several other large on-going survey studies (Dr. Ryan of the Millennium Cohort Study and Dr. Kang of the National Health Survey) to ask them about the consent procedures they were using. Based on our experience with MA ARNG members, we felt having a witness signature requirement on a formal consent form was a burden for the subjects that might be affecting response rate. Also, we felt that if we could offer some type of reimbursement to subjects for their time and effort in completing the survey that it might increase response rate. So, in September 2001, we initiated a request to the BU IRB and the HSRRB to remove the requirement for a witness signature for this study of minimal risk and we proposed to include a lottery-type reimbursement plan. (This request required revisions to the consent form and cover letter.) The reimbursement plan we proposed was that all persons who participate in this research study would be eligible\* to receive a cash reimbursement. At the conclusion of the study, we would conduct a random drawing and distribute ten checks each worth \$500 and twenty checks each worth \$250 to those 30 individuals whose study numbers we select at random. [\*According to US Army policy, subjects on Active duty are not allowed to receive reimbursement for participation in research studies, thus we needed to include a place on the consent form for subjects to indicate whether or not they were on Active duty ARNG service when completing the survey.] This type of reimbursement plan is not new; it has been used in a number of large workplace studies conducting surveys of workers' health and performance. The BU IRB approved this modification on 11/15/01. The request to waive the need for a witness signature required a policy decision by the full HSRRB and they also requested further changes to the consent form and cover letter and clarification and information on the reimbursement plan that we provided. The HSRRB approved our requested changes on December 5, 2001.

With the IRB approvals, we have moved forward and are re-initiating our mail survey plan (using the local research group as the vendor for the printing, mailing, processing, and data entry procedures). The

printing of all the survey and mailing materials proceeded in January 2002 and it is anticipated that initial survey mailing will begin March 1, 2002.

***Task 3- Set up of data entry procedures. [STATUS: Complete]***

As the survey instrument has not changed since the one approved and used last May, we already have the survey template set up for integration into SPSS and/or SAS statistical software for analyses. The scoring syntax for all the scales in use in the survey has also been developed and is ready for use.

Additionally, as reported in last year's AR we have made arrangements for MA ARNG to enter and store HRA data for subjects who have had their periodic medical examinations within the past 2.5 years (since July 1, 2000). To date, there are approximately 3000 subjects in the MA ARNG database. At the conclusion of the survey study, we will ask the MA ARNG to extract the HRA data for those subjects who have provided their consent. We will also submit our list of subjects providing consent to COL Rubertone who directs the national database of HRA data. However, as described in last year's AR, we do not anticipate that a substantial number of MA ARNG members will have HRA data in the national database, as it primarily contains Active duty Army members.

***Task 4- Data entry completed. [STATUS: In Progress]***

Data entry has not been completed (as the survey phase has not been completed). The data collected from the returned surveys to date (5%) have been entered and preliminary analyses conducted (see Task 8 below).

***Task 5- Convene Advisory Group to discuss response rates and analytic plans. [STATUS: Complete]***

The annual Advisory Group meeting was held December 4, 2001. The primary purpose was to discuss the response rate issues and our proposed plans to address this. Our National Guard colleagues thought that including some type of reimbursement to subjects completing the survey would help to increase response rates. We also discussed trying to set up a 'National Guard Day' at a movie theater chain and offer free or reduced rate movie tickets to all MA ARNG members regardless of whether they participated in the study or not as a way of increasing publicity and of saying thank you.

***Task 6- Data checking and cleaning completed. [STATUS: In Progress]***

Data checking and cleaning has not been completed (as the survey phase has not been completed). For the data collected from the returned surveys to date, checking and cleaning procedures have been carried out.

***Task 7- Initiate and carry out linkage to HRA database. [STATUS: In Progress]***

As described above under Task 3, MA ARNG staff members have been entering HRA data for soldiers who have had their medical examinations within the past 2.5 years. At the conclusion of the survey study, we will ask the MA ARNG to extract the HRA data for those subjects who have provided their consent. (In February 2002, we completed this data extraction procedure for those subjects in the deployment health study that have provided consent (see Task 4 below), so we have confidence that the extraction procedures will work.)

**Task 8- Preliminary data analyses and descriptive analyses [STATUS: In Progress]**

Although the survey phase has not been completed, we have performed preliminary analyses on the data collected to date from the initial 611 subjects who returned completed surveys. **Table 1** presents the descriptive characteristics of the group overall and stratified by whether they are current or former MA ARNG members. The general distribution within Massachusetts National Guard members (information from Mike Dove at the Defense Manpower Data Center (DMDC)) is approximately 10% female and 80-90% White, Caucasian. The findings from this group of responders indicate that they are similar in terms of gender and ethnic distribution. As might be expected, the group of former ARNG members is significantly older than the former members group. This observation is most likely related to the fact that former members have reached an age and/or cut-off number of years of service in order to retire from the ARNG. The group of former members is also more likely to be currently married.

**TABLE 1. Descriptive characteristics of current and former MA ARNG members who returned survey.**

	All Subjects (n=611)	Current ARNG (n=383)	Former ARNG (n=207)	Significance
<b>Age, mean(SD)</b>	40.96 (11.94)	38.98 (10.79)	44.6 (13.13)	***
<b>Education, mean(SD)</b>	14.36 (2.53)	14.46 (2.48)	14.16 (2.65)	ns
 <b>Gender</b>				
% Female	12.6	13.6	11.6	ns
 <b>Race</b>				
% White/Caucasian	86.1	85.4	87.9	ns
 <b>Marital Status</b>				
% Married	60.2	56.4	67.6	**
 <b>Rank</b>				
Enlisted	27.3	25.8	29.5	
NCO	52.5	53.0	52.2	
Officer	19.6	20.9	17.4	ns
 <b>Years of ARNG Service</b>				
< 5 years	25.2	26.9	21.3	
5 or more years	74.5	73.1	77.8	ns
 <b>Deployment History</b>				
% Deployed Previously	27.7	29.0	27.1	ns
 <b>General Health Rating</b>				
% Rating of Fair or Poor	4.7	4.2	5.8	ns
 <b>Presumptive PTSD</b>				
% Yes	5.1	5.5	4.4	ns

NOTE: Due to missing data, the comparison analyses between Current and former ARNG members is based on n=590.

\* p < 0.05

\*\* p < 0.01

\*\*\* p < 0.001

In further preliminary analyses, we have begun to explore several of the hypotheses set forth in the grant.

As hypothesized, functional health status of ARNG members is significantly better than US population (*Hypotheses #1*, results not presented here). Also, former ARNG members have significantly lower physical functional health status compared to those who are currently still in the MA ARNG but do not differ in mental health functional status (*Hypotheses #7*). Because former MA ARNG members were significantly older than current members, we reran the comparison of physical functioning scores adjusting for age. The differences between the groups remained significant.

**Table 2.** SF36V summary scores- Comparison between current and former MA ARNG members.

	ALL SUBJECTS MEAN (SD)	CURRENT ARNG	FORMER ARNG	Significance level
		MEAN (SD)	MEAN (SD)	
<b>SF36V SCORES</b>				
<b>PCS</b>	52.9 (7.99)	53.88 (7.35)	51.22 (8.65)	***
<b>MCS</b>	53.17 (9.32)	52.9 (7.43)	53.81 (9.15)	ns
<b>PF</b>	92.44 (15.57)	94.16 (13.59)	89.42 (18.3)	***

PCS= Physical Component Summary score from SF36V

MCS= Mental Component Summary score from SF36V

PF= Physical Functioning Subscale score from the SF36V

US population norms (Ware et al., 1994): PCS= 50 with standard deviation=10.  
MCS= 50 with standard deviation=10.

\* p < 0.05

\*\* p < 0.01

\*\*\* p < 0.001

Also, we have initiated preliminary analyses to examine whether increased job strain (determined by high job demands and/or low job control) in one's military and civilian job is related to lower functional health status, increased fatigue symptomatology (*Hypothesis #3*) and poorer ARNG and civilian job performance (*Hypothesis #4*). Examination of the correlations between these independent and dependent variables (**Table 3**) suggests that ARNG job demands or degree of job control are not strongly correlated with worse physical functional health. However, more control experienced in one's ARNG job was significantly correlated with better mental functional health and lower fatigue levels. Increased ARNG job demands and less ARNG job control was significantly correlated with poorer ARNG job performance measures (e.g., missing work, injury on the job).

Due to the temporal differences in survey data collection procedures, we will initially analyze the survey data collected in 2001 separately from those survey data to be collected in 2002 when exploring the study hypotheses.

TABLE 3. Correlation matrix

	Age	Education	NG demands	NG control	Civ demands	Civ control	PCS	MCS	Fatigue	NG perform	Civ perform	NG A cope	NG P cope
Age	1	.093*	-.35	.256**	-.096*	.076	-.246***	.190**	-.069	-.128**	-.146**	.071	-.137**
Education		1	-.019	.127**	.113*	.293**	.113**	.122**	-.154**	0.004	-.021	.183**	-.068
NG demands			1	.321**	.272**	0.039	0.049	-.012	-.071	.091*	-.006	.281**	-.079
NG control				1	0.064	.215**	0.033	.271**	-.304***	-.256**	-.119**	.382**	-.224**
Civ demands					1	.091*	0.072	-.132**	0.001	.160**	.129**	0.061	0.058
Civ control						1	-.012	.160**	-.182**	0.074	-.096*	.134**	-.069
PCS (SF36V)							1	-.078	-.353***	-.097*	-.192**	.091*	-.033
MCS (SF36V)								1	-.670***	-.252**	-.291**	.090*	-.128**
Fatigue									1	.282**	.334**	-.156**	.111*
NG perform										1	.419**	-.094*	.121**
Civ perform											1	-.085	.115*
NG A coping												1	-.069
NG P coping													1

NG demands= ARNG job demands, NG control= ARNG job control, Civ demands= civilian job demands, Civ control= civilian job control, PCS= Physical Component Summary score from SF36V (higher number indicates better health), MCS= Mental Component Summary score from SF36V (higher number indicates better health), Fatigue= summary score for Fatigue symptomatology, NG perform= ARNG job performance (higher number indicates worse performance), Civ perform= civilian job performance (higher number indicates worse performance), NG A coping= degree of active coping used in response to problems at ARNG job, NG P coping= degree of passive coping used in response to problems at ARNG job.

\* p &lt; 0.05

\*\* p &lt; 0.01

\*\*\* p &lt; 0.001

### Summary of Year 2 Work Tasks

At the end of this second year of funding, we have made progress on all the tasks set forth this year. For those issues that we have identified along the way as needing specific attention, we have taken specific actions (see below). We anticipate completion of all the SOW tasks at the conclusion of the grant period.

#### Specific actions taken:

- ◆ New survey mailing plan.  
As described above, we have revised our survey-mailing administration plan to be more efficient in terms of being able to process in-coming mail and address changes and to send out the reminders in a timely manner according to our original proposed plan. With the waiver of the witness signature and reimbursement strategy, it is our hope that subjects will be more likely to respond. (We are aware that other national surveys of veterans and military personnel such as the Millennium Cohort Study have recently received lower than anticipated response rates as well, so we are not an isolated case.)
- ◆ Increase publicity and communication with research subjects.
  - 1) We initiated a study website ([www.nationalguardstudy.org](http://www.nationalguardstudy.org)) to provide a more efficient way to provide information to potential subjects about the two related ARNG research projects. We hope to be able to set up a list-serve to inform subjects about the progress of the studies as well. We are aware that any text to go on the Website requires IRB approval prior to being posted.
  - 2) Throughout November and December 2001, the PI traveled to several MA ARNG Armories during their drill weekends in order to brief soldiers on the two research studies. The soldiers appeared to be very receptive to talking in-person about the research and getting their questions answered. She will continue to visit MA ARNG sites throughout the spring (2002) as the survey and reminders are being mailed and as the post-deployment assessment phase of the deployment health study is being carried out.

### **PROJECT #2: Deployment Health Issues (prospective field study)**

#### Deployment Health Study (Year 1)

In February 2001, it came to our attention that a group of MA ARNG members were due to be deployed to Bosnia in August/September 2001. We requested the opportunity to collect more extensive pre-deployment data regarding their health and cognitive functioning skills along with members of a comparison group that is not being deployed. (See further description in last year's Annual Report under Reportable Outcomes.) In summary, we submitted a request for supplemental funds to conduct a prospective field study (pre- and post-deployment) with these ARNG members and a comparison group (request submitted 2/13/01). The request was initially approved and funding awarded May 2001.

The project has 3 primary objectives:

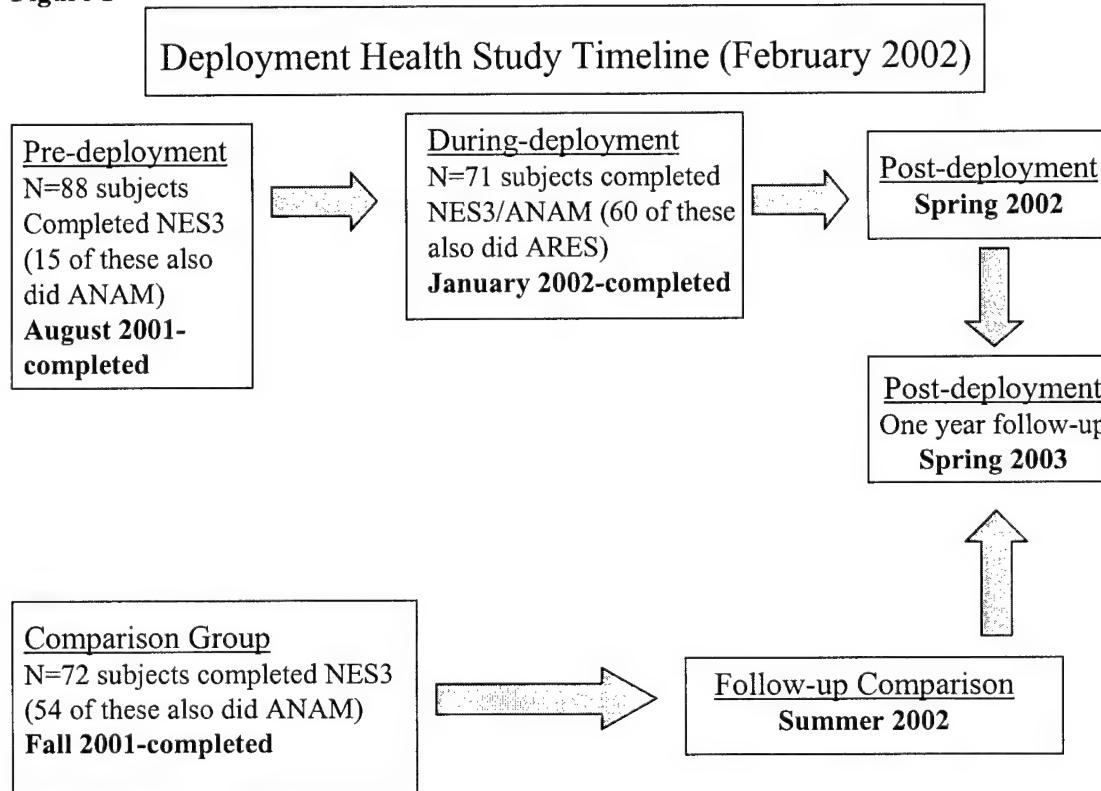
- 1) Characterize and descriptively analyze selected outcome variables concerning functional health, cognitive abilities (in terms of attention and concentration) as measured by computer-assisted tests from the Neurobehavioral Evaluation System, Inc. (NES3), and general well-being (such as the HRA risk index score, diastolic and systolic blood pressure that are collected as part of routine ARNG medical evaluations) in a group of MA ARNG before deployment and compare the results to those obtained from comparison group of MA ARNG members who are undergoing their routinely scheduled ARNG training exercises and/or medical examinations over the same time period (pre-deployment comparisons).

- 2) Compare differences in the various outcome variables over time within the Bosnia deployed group (e.g., pre-, during-, and post- deployment) and within the comparison group.
- 3) Contrast the differences over time between the Bosnia-deployed group and the non-deployed group.

An additional request and amended SOW was submitted in June 2001 to include a during-deployment assessment (with the support and assistance of MAJ Ness, US Army Medical Research Unit-Europe) and to additionally include cognitive tests from the Automated Neurocognitive Assessment Module (ANAM, Reeves et al., 2000) in order to validate in comparison to NES3 tests. The ANAM is a computer-assisted cognitive test battery that has been developed over the past 20 years within the military setting. This amended SOW was approved in July 2001. (BU IRB and HSRRB approvals for this project were made in July 2001.)

The approved study protocol involves asking members from both the deployed and non-deployed comparison groups to participate in an interview to examine current health and ARNG job characteristics, complete a brief survey of concerning current health status, and perform a cognitive test battery (to examine attention and concentration abilities) with a combination of computer-assisted tests (i.e., NES3 and ANAM tests). For those participating subjects who are being deployed to Bosnia, they are being assessed pre-deployment, during-deployment, immediately post-deployment, and one-year post-deployment. The participating subjects in the comparison group are being assessed at three timepoints within a time frame comparable to the deployed group's pre-deployment, post-deployment, and one-year post-deployment testing sessions.

**Figure 1**



Additionally, we are requesting the subjects' permission to review their medical, HRA and Army Physical Readiness Test (APRT) records so as to include some objective clinical measures of functional health (e.g., blood pressure, cholesterol, height, weight, and physical fitness levels). Also, we are requesting

Armed Forces Qualification Test (AFQT) tests scores (for a measure of basic academic skills). Some of these data may be found in US Army or National Guard or DMDC databases. As we have found when carrying out the currently funded survey study, some of these data are currently collected by the ARNG, but not all are routinely entered or transferred into any type of existing state or national database (i.e., the information may remain as paper work in the subjects' medical record (such as vaccine records) or it may be discarded if there are no significant clinical indications for keeping it (such as HRA survey data for those persons less than 38 years of age)). For this project, along with the PI's currently funded survey study, we have made an agreement whereby the MA ARNG personnel will enter the HRA data for all persons completing this survey during the time period of the funded study. We are requesting access to those data for those persons who have provided specific consent for us to do so.

Five reliable and validated scales are being administered across all assessment phases: 1) Medical Outcomes Study (MOS) Short Form 12 (Ware et al., 1996), adapted for use in veterans (SF12V, Kazis et al., 1999), 2) MOS cognitive functioning scale (Stewart et al., 1992), 3) questions concerning ARNG job demands (Karasek et al., 1985), 4) unit cohesion and leadership support scales (Marlowe, 1987), and 5) physical and mental fatigue symptomatology (Smets et al., 1995; Beurskens et al., 2000). We are also administering the Profile of Mood States (POMS, McNair et al., 1971) and the PTSD Checklist (Weathers et al., 1993).

The cognitive test battery consists of reliable and validated tests (presented to the subjects on a computer) that are part of the Neurobehavioral Evaluation System (NES) battery of tests (Letz, 1990, 1999): Finger Tapping Test, Continuous Performance Test, Trail-Making Test, and the Digit-Symbol Substitution test, and a test to measure basic academic abilities (Wide Range Achievement Test (WRAT)-Reading (Jastek et al., 1984). We have also included the Test of Memory Malingering (TOMM, Tombaugh, 1996). Also, we have included several similar cognitive tests from the ANAM test battery (Reeves et al., 2000), such as the ANAM Continuous Performance Test and the ANAM Code Substitution Test (tests similar in functional domain being tested in the NES Continuous Performance Test and the NES Digit-Symbol Substitution Test) in order to conduct a validation study of some of the ANAM tests. In the interviews with the Bosnia-deployed group, subjects are being asked to describe their anticipated hopes for the deployment (pre-), their deployment experience expectations and satisfaction (during-), and their opinions about how the deployment was for them (post-). In the non-deployed group, similar questions about their opinions and expectations about potential deployments have been included. The interview questions are drawn in large part from the work of Bartone and colleagues that examine Job Importance, Soldier Engagement, and Peacekeeper Identity (Britt et al., 2001; Bartone et al., 1996).

Subjects have been asked for their informed consent for participation in this prospective study (i.e., for the request to review their medical records and US Army database information and for the in-person interviews and testing procedures).

#### **Approved SOW tasks for deployment health study project (January 23, 2001- January 24, 2002)\***

'01-start date		
<b>Task 1</b>	Month 1	Orient project staff to project tasks
<b>Task 2</b>	Months 2-7	Interview and test group of both MA ARNG deployed and control groups: pre-deployment Set-up subject tracking procedures
<b>Task 3</b>	Months 4-12	Plan and test group of Bosnia-deployed subjects during-deployment
<b>Task 4</b>	Months 8-12	Analyze collected data

\* as this funding award was not initially made until May, 2001, the timetable in terms of the award has been altered to end July 2003.

***Task 1. Orient project staff to project tasks. [STATUS: Complete]***

In July 2001, the hiring of new project staff and training of research team members being ask to travel to ARNG Armory sites around Massachusetts was initiated. The PI met with the Adjutant General of the MA ARNG (BG Keefe) in July 2001 to update him on the initiation of this deployment health study. He expressed strong support for this project. Additionally, the PI continued her periodic study updates with COL Zimelman (MA ARNG State Surgeon) and initiated meetings several ARNG officers responsible for the coordinated Bosnia deployment effort. Also, as part of the initial month start-up period, the PI made contact with the various collaborators to tell them this project was funded and inform them of the timeframe of the project.

***Task 2. Interview and test group of both MA ARNG deployed and control groups: pre-deployment & Set-up subject tracking procedures [STATUS: Complete]***

Scheduling and testing of the to-be-Bosnia-deployed group took place in late July and August 2001. Subjects were primarily tested at their respective company Armories across the state. A total of 89 subjects completed the survey, interview, and NES3 battery of tests (with 15 of these subjects also completing the ANAM test battery). An additional 6 subjects completed just the survey.

The events of September 11, 2001 and the immediate impact it had on MA ARNG logistics played a definite role in our plan to conduct the assessment of the control group of non-deployed ARNG members in September 2001 as we had planned. Due to increased security, as a study team we were not allowed access to MA ARNG Armory sites until late October. Therefore, scheduling and testing of the comparison group members took place between late September and December 2001. Also, as the project proposal was written, we planned to include a control group of non-deployed ARNG members who would be similar to the Bosnia-deployed group in most all respects except deployment status. With the movement of some ARNG members to active status and the general heightened state of alert following September 11, the group of subjects tested may not be a true control group. Therefore, we refer to the non-deployed group members of a comparison group rather than a control group, and in subsequent prospective analyses within and between groups we will explore the potential impact that September 11<sup>th</sup> might have on the study's results.

A total of 71 comparison group subjects completed the survey, interview, and NES3 battery of tests (with 54 of these subjects also completing the ANAM test battery). An additional 5 subjects completed just the survey.

Although not described in our SOW, we planned to administer the ANAM battery to all persons completing the NES3 battery through the course of the study when time permitted. During the pre-deployment testing sessions, time availability was an issue as the soldiers were also preparing to leave. Because of this, only a few of the subjects completed the ANAM test battery during the pre-deployment assessments.

***Task 3. Plan and test group of Bosnia-deployed subjects during-deployment [STATUS: Complete]***

The planning and logistics of the during-deployment assessment was largely carried out by MAJ Ness and CPT Thomas with the USAMRU-E in Heidelberg, Germany. In December 2001, the PI traveled to Heidelberg in order to meet with MAJ Ness and to train affiliated personnel to carry out the study protocol. The during-deployment assessment was conducted in January 2002 over a 2-week period. The PI traveled to Bosnia to supervise and assist in the data collection.

A total of 71 subjects did the full protocol during-deployment, which included the survey and NES3 and ANAM battery of tests. This group of 71 subjects included 66 subjects who had completed the full

protocol during the pre-deployment phase and 5 of the 6 persons who completed just the survey during the pre-deployment phase. A subgroup of subjects (n=60) also performed some of the ANAM tests adapted to be administered via a hand-held computer device.

While in Bosnia, we learned that one of the subjects tested pre-deployment did not actually deploy. Also, another subject had initially deployed, but had returned home when we conducted the during-deployment phase. Thus, we calculate the follow-up response rate (for those completing the full protocol at both timepoints) to be 66/88 or 75%.

The majority of the deploying MA ARNG members in this study were from infantry units, however, one unit group was primarily a headquarters unit that was dispersed to different locations for various tasks while in Bosnia. Thus, the majority of subjects that we were not able to follow-up on during the deployment assessment (18/21) were not accessible/available to us due to the nature of their deployment mission. The remaining 3 persons were on authorized leave during the time when we were conducting the study in Bosnia.

Also, during the course of this study, we have been informed that the deployment period is for 6 months not 9 months as was previously reported in the original proposal.

***Task 4. Analyze collected data. [STATUS: In progress]***

To date, we have completed the sample recruitment for this prospective study and carried out the pre- and during-deployment assessments. The analyses of collected data are currently in progress. We have initiated efforts to integrate all the various data sources (survey, interview, computer tests, HRA, medical records, APRT, and AFQT scores) into a master data template. We have obtained HRA data from ~70% of the 155 subjects who provided their consent for us to access this information. We have obtained AFQT data from DMDC for ~90% of the subjects. We are currently initiating the process to review medical records. APRT test scores have been provided for the majority of subjects for their tests conducted last year; we plan to collect post-deployment test score data as well in the year to come.

The PI has been aware that the US Army Center for Health Promotion and Preventive Medicine (CHPPM) has been conducting environmental monitoring in Bosnia through the course of US deployments there. In December 2001, the PI spoke to Brad Hutchens at CHPPM about obtaining data on measured air particulate levels in Bosnia and he has provided these data to the PI. Thus, in addition to the health data collected on the deployed group, we will also examine if particulate matter exposure is related to specific health outcomes in this group. (While in Bosnia, the PI was very aware of the poor air quality. Apparently, the primary heat source is to burn coal and this generates a large degree of air particulates or soot, especially in the winter months.)

The deployed group and the comparison group differ in some respects. The differences are largely accounted for by the one group within the deployed group (described above as those from the headquarters-type unit) that tended to have older, more educated, and higher-ranking personnel. When we remove this subset and rerun the comparison analyses, the deployed group and comparison group do not differ significantly in terms of these descriptive characteristics (**Table 4**).

**Table 4.** Descriptive characteristics of study groups.

	All subjects completing initial testing protocol			Subjects completing initial testing protocol minus the group from deployed unit with different role	
	Deployed group (n=88)	Comparison group (n=72)	p-value	Deployed group (n=64)	p-value
Age	29.3(8.7)	25.2(7.2)	0.002	26.5(6.9)	ns
% White, Caucasian	83.0	77.1	ns	84.4	ns
% Married	26.1	23.9	ns	15.6	ns
% > high school education	78.4	63.9	0.04	76.6	ns
% Officer	18.2	4.2	0.006	10.9	ns

#### Summary of Year 1 Work Tasks

In summary, we have completed all the tasks set forth in this project according to the SOW.

Through the course of carrying out these 2 research projects, additional new research ideas are being developed. Preliminary analyses (presented in Table 3 above) suggest that the type of methods used by subjects in response to stress or problems on their ARNG job (such as active or passive coping procedures) are correlated with fatigue symptomatology, functional health status, and job performance measures. Studies in animals suggest that there are physiological and neuroendocrine differences between those with a proactive v. reactive coping style, that in turn, confer a difference in one's susceptibility to develop particular health outcomes such as cardiovascular pathology, ulcer formation, and infectious disease (Koolhaas et al., 1999). We hypothesize that an individual's method of coping to specific job related events or demands might have different physiological effects that in turn, may influence the resulting presence, course, and/or type of various signs and symptoms. Of particular interest to the PI is to design and test an intervention or training module to prevent or reduce the adverse impacts of ARNG job characteristics (including during deployment missions) on job performance and functional health (including cognitive readiness).

#### **KEY RESEARCH ACCOMPLISHMENTS**

During this funding period (Jan. 24, 2001- Jan. 23, 2002), we have completed most of the tasks set out in the Approved Statements of Work for both projects.

For project #1, those tasks not currently completed have largely been due to delays in IRB approvals or logistical concerns that have prompted us to revise the study plan. In some cases, the revised plans have required additional IRB review and approvals that have contributed to further delays. Despite the delays, specific plans are underway to complete all tasks by the conclusion of the funding award.

The following research accomplishments have resulted in Project #1 (the survey study):

- Comprehensive survey instrument has been developed to query current and former ARNG members about their jobs and aspects of their jobs that might impact their health.
- A data management system has been set-up to enable efficient integration of the collected survey data with the HRA data obtained from MA ARNG databases.
- Establishment of a study website for more efficient communication to and from research subjects and other interested parties.

For project #2, the SOW timetable is on track.

The following research accomplishments have resulted in Project #2 (the deployment health study):

- Established a cohort of Bosnia-deployed MA ARNG subjects for prospective study.
- Established a comparison group of non-deployed MA ARNG members for prospective study.
- Laid the groundwork to include and integrate other medical-type data records (HRA, medical records, AFQT, and APRT) into the dataset for analyses in this prospective study.
- Successfully integrated ANAM tests into the study protocol in order to conduct a validation study of the ANAM in comparison to performance on the NES3 tests.
- Successfully tested the administration of ANAM tests on a hand-held computer device (ANAM Readiness Evaluation System, ARES) in the field.

## REPORTABLE OUTCOMES

### 1. Manuscript in preparation (to be submitted within the next month).

The PI is also longitudinally following a group of Gulf War veterans (Devens Cohort Study) and has recently performed a descriptive study on the factors related to retention in the ARNG following GW service within the Devens cohort (Proctor et al., 2001b). Those who were officers during the GW and those who reported a higher level of unit cohesion and leader support (as measured by WRAIR unit cohesion scales; Marlowe, 1987) during their GW service were more likely to have remained in the ARNG six years post deployment. The results of these analyses are described in a manuscript soon to be submitted for publication consideration.

### 2. Active collaboration with MAJ Ness and the USAMRU-E and Dr. Dennis Reeves who have working on the development and validation of the ANAM & ARES.

### 3. New research ideas being developed.

As described briefly above, the PI is currently exploring new research ideas that have been raised through the conduct of the projects funded through this award.

## CONCLUSIONS

The work on these funded projects are on going. When completed, they will provide important information about the health and well-being of ARNG forces in the current Army climate and will identify occupational factors that relate either negatively or positively to health status and/or job performance (including cognitive readiness) and that can lead to implementation of effective intervention strategies that will protect and improve the health of National Guard members in the current military environment.

Recent efforts in the area of deployment health and Force Health Protection appear largely focused in the Active duty arena. There is also a need to provide some focused effort on National Guard and Reserve forces and this research need has been identified by the Institute of Medicine (1999, 2000) and mentioned at the recent session concerning Force Health Protection at the Conference on Illnesses among Gulf War Veterans (January 2001). The Army National Guard operates under a somewhat different structure than the Active Duty Army: politically, bureaucratically, and socially. Thus, to be most beneficial in designing effective strategies in deployment health protection one needs to understand the nature of who and what make up the ARNG forces in this current climate, as well as the State and National frameworks in which they operate. The two projects being conducted under this funding award survey are some of the first to focus of the specific occupational health issues surrounding ARNG service and deployment health.

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# APPENDIX

## **OCCUPATIONAL HEALTH STUDY OF ARMY NATIONAL GUARD MEMBERS SURVEY CONTENTS**

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**COVER PAGE (1 page)**

**INSTRUCTIONS (1 Page)**

***Section A. General Information***

***Section B. ARNG Job Information***

***Section C. Civilian Job Information***

***Section D. Non-work activities***

***Section E. Medical Health***

***Section F. Health Status***

***Section G. Physical Symptoms***

***Section H. Characteristics of your ARNG Job***

***Section I. ARNG Workplace Exposures***

***Section J. Relationships with Family and Friends***

***Section K. Characteristics of your Civilian Job***

***Section L. Civilian Job Workplace Exposures***

***Section M. Health Symptoms***

***Section N. General Lifestyle Questions***

***Section O. Support***

***Section P. Current Mood***

***Section Q. Personal Characteristics***

***Section R. ARNG Service- Checklist***

**TEAR OFF PAGE- Contact Information (1 page; this page will be separated from the survey when it is mailed back to us so that identifier information is not kept with the survey information.)**

## **SOURCE OF QUESTIONS/SCALES**

### **Section A. General Information**

[NOTES: questions include- today's date; dob; sex; race; highest grade(open); highest grade(category); repeat grade; marital status; spouse work outside home?; spouse hrs. of work; spouse ARNG member?; have children?; # children at home; income; health insurance?; family history ques.]

### **Section B. ARNG Job Information**

[NOTES: questions include- currently in ARNG?; date left if not; /duration in ARNG, active duty service?, time in present unit?, military pay grade, & NG category, NCO? are questions from Galioto, 1988; p. 98-99/; current MOS; current ARNG unit (write out)]

### **Section C. Civilian Job Information**

[NOTES: questions include- current job title; category?; currently employed outside ARNG; in civilian job?; duration with current employer?; duration on job?; job situation; shift?; duration of that shift?; # hrs/week worked; OT hrs; mandatory OT?; eligible for OT pay?]

### **Section D. Other activities**

[NOTES: questions include- 4 questions from NIOSH Job Stress Questionnaire about childcare responsibilities, elderly care responsibilities, etc.]

### **Section E. Medical Health**

[NOTES: questions include- 1 question from CDC's Behavioral Risk Factor Surveillance System Questionnaire found at <http://www.cdc.gov/nccdpb/brfss/about.htm> ; list of medical conditions to endorse (or not)]

### **Section F. Health Status**

[NOTES: questions include- 36 questions from SF36V (Ware 1993, 1994; Kazis et al. 1999); 4 q. from MOS cognitive functioning scale]

### **Section G. Physical Symptoms**

[NOTES: questions include- 20 questions concerning fatigue symptomatology from the Checklist of individual strength (CIS; Beurskens et al., 2000)]

### **Section H. Characteristics of your ARNG Job**

[NOTES: questions include- 31 questions from the Job Content Questionnaire (JCQ; Karasek et al., 1985: 6 q. on skill discretion (jq #1,2,3,5,7,9); 3 q. on decision authority (#4,6,8); 9 q. on workload (#12,13,15,16,19,20,21,22,25); 5 q. on work demands (#14,17,18,23,24); 2 q. on job security (#27,28); 1 q. on skill utilization (#31); others; 1 q. on # days out of work (Polk et al; 1984); 6 q. on coping with ARNG work (NIOSH Job Stress Questionnaire); for work performance on ARNG- 6 q. from Mangione et al. (1999) & 4 q. from MacEwen & Barling (1994); 4 additional questions from Lew Pepper's DoE Downsizing study]

### **Section I. ARNG Workplace Exposures**

[NOTES: questions include- 3 workplace exposure q. from JCQ; 5 q. from Proctor et al. occupational exposure studies]

### **Section J. Relationships with Family and Friends**

[NOTES: questions include- 10 q. on Family Strains, McCubben et al., 1996; 10 q. from Family Support Inventory for Workers (FSI-W; King et al., 1995, 2000); 1 q. on deployment issues; 1 q. about recommending ARNG job service]

### **Section K. Civilian Job Characteristics**

[NOTES: questions include- 32 Ques. from JCQ: 6 q. on skill discretion (jq #1,2,3,5,7,9); 3 q. on decision authority (#4,6,8); 9 q. on workload (#12,13,15,16,19,20,21,22,25); 5 q. on demands (#14,17,18,23,24); 3 job security (26,27,28); 1 skill utilization #32; others

# days out (Polk et al.; 1984);  
6 q. coping with job (NIOSH survey);  
for work performance on civilian job- 6 q. from Mangione et al. (1999) & 4 q. from MacEwen & Barling (1994);  
10 q. from FSI-W (Kings et al., 1995, 2000)]

#### ***Section L. Civilian Job Workplace Exposures***

[NOTES: questions include- 3 workplace exposure q. from JCQ; 5 q. from Proctor et al. occupational exposure studies]

#### ***Section M. Health Symptoms***

[NOTES: questions include- 25 q. from Gulf War study, Proctor et al., 1998]

#### ***Section N. General Lifestyle Questions***

[NOTES: questions include- 3 q. on EtOH use & CAGE (Ewing et al., 1984 + modified version in Fertig et al., 1993); 4 q. on smoking]

#### ***Section O. Support***

[NOTES: questions include- 20 q. from NIOSH Job Stress Questionnaire (from Caplan 1975); adapted to include ARNG supervisor and unit members]

#### ***Section P. Current Mood***

[NOTES: questions include- 19 q. from BSI (Derogatis, 1993); 17 q. from PTSD Checklist (PCL; Weathers et al., 1993)]

#### ***Section Q. Personal Characteristics***

[NOTES: questions include- 27 q. from Eysenck 1968; Floderus 1974; 6 q. Life Events (adapted from Norris et al., 1990)]

#### ***Section R. ARNG Service-Checklist***

##### **Reasons for joining:**

Education benefits  
Job-skills training  
Military training opportunities  
Military values and lifestyle  
Opportunity for deployment missions  
Pay and benefits  
Service to country  
Type of assignments

##### **Reasons for staying/remaining:**

Basic pay  
Belonging to a team  
Camaraderie, sense of esprit de corps  
Education benefits  
Enlistment promises met  
Job security  
Job-skills training  
Military training opportunities  
Military values and lifestyle  
Opportunity for deployment missions  
Responsive leadership  
Retirement pay  
Service to country  
Type of assignments

##### **Reasons for leaving:**

Amount of personal or family time  
Availability of needed equipment, parts, and materials  
Civilian job concerns  
Deployment missions  
Emotional problems  
Family concerns  
Forced retirement  
Lack of recognition  
Leadership quality  
Level of manning in your unit  
Limited advancement opportunities  
Medical or physical problems  
Military values and lifestyle  
Not promoted  
Not treated fairly  
Pay problems  
Personal workload  
Physical training  
Type of assignments  
Work not challenging